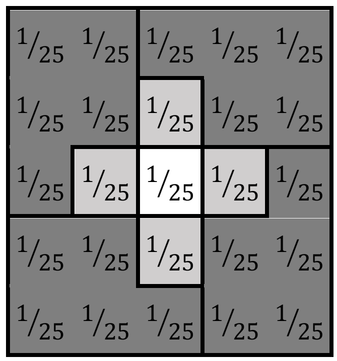
9. Jennifer

Program Name: Jennifer.java **Input File: jennifer.dat**

While studying infinite sums in her Calculus class, Jennifer was introduced to the well-known proof which shows that $0.99\overline{9} = 1$. Being well-versed in the world of mathematical bases, Jennifer's Calculus teacher showed them a similar proof to show what this would be equivalent to in a base five numbering system.

The idea is that if you take a square with side length of 1, and break it down into 25 congruent squares, you can form four identical sections, each with 5 of the congruent squares. This would mean that each of those sections comprise 1/5th of the area of the whole square. Doing so would also leave you with 5 remaining squares. If you were to take 4 of the remaining 5 squares, you would then have four new sections each comprising 1/25th of the area of the whole square. Then, take the last remaining square, and perform the entire process again on that square infinitely.



This means that $4\left(\frac{1}{5}\right) + 4\left(\frac{1}{25}\right) + \cdots + 4\left(\frac{1}{5}\right)^n = 1$. In other words, for a base five numbering system, $(0.44\overline{4})_5 = 1$. However, Jennifer was interested to see whether or not this property of infinite sums generalized to different bases. While investigating this, Jennifer discovered a generalized formula which showed that for all $|x| \geq 1$, where x is equivalent to the base, that…

$$(x-1)\sum_{n=1}^{\infty}\left(\frac{1}{x}\right)^n = 1$$

Discovering this generalized formula got Jennifer interested in the notion of non-integer bases. Specifically, given the inverse of an arbitrary base, help Jennifer determine the most simplified number of sections that will be required at each stage in the infinite sum process.

Input: The first line will be a single integer T $(1 \leq T \leq 100)$ denoting the number of test cases to follow. The next T lines will consist of 2 space-seperated integers, n and d $(1 \leq n, d \leq 2^{31} - 1)$, denoting the numerator and the denominator of the inverse of the current base. It is guaranteed that the value of $\left|{}^{d}/_{n}\right| > 1$.

Output: For each of the T test cases, output two space-separated integers, n_s and d_s, denoting the simplified numerator and denominator of the number of sections that are required at each stage in the infinite sum process.

Sample input:
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2
3 4
341 1054
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Sample output:
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1 3
23 11
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